

original remarks, so that any future reference to the original manuscript observations is now unnecessary.

Besides the works already referred to, Luther published many papers relating to the observations made at the Königsberg Observatory and the results derived from them.

Luther's lectures on astronomy were based mainly on those of Bessel which have never been published, but which were thus made known to his disciples.

As a teacher Dr. Luther was most diligent and conscientious, and there are many who remember with gratitude the instruction he gave them so readily and clearly, and with so many sacrifices of his time and strength. His nature was both amiable and philanthropic, and he was greatly respected. After protracted sufferings he passed tranquilly away on October 17, 1887; and with him has departed one of the last of the school of the illustrious Bessel.

Dr. Eduard Luther was elected a Foreign Associate November 11, 1864.

HANS CARL FREDERIK CHRISTIAN SCHJELLERUP was born on February 8, 1827, at Odense, a provincial town in Denmark, where his father was a jeweller. He was at an early age apprenticed to a watchmaker, but by private study he succeeded in supplementing the education he had received in his native town so well that he was able to pass the entrance examination at the Polytechnic School of Copenhagen in the autumn of 1848. Here he distinguished himself by his mathematical ability, and was able to finish his studies in the short space of two years, when he passed the final examination in applied mathematics and mechanics.

In 1851 he was appointed observer in the old University Observatory at Copenhagen, which had been built at the time of Longomontanus on the top of a high tower within the city, and was therefore, after the lapse of two centuries, greatly behind the times in every way. It had repeatedly been improved and furnished with new instruments, but there was only room for small ones, and they could not be firmly mounted, owing to the unsuitable locality. Shortly afterwards Schjellerup was also appointed instructor in drawing at the Polytechnic School, and in 1854 Professor of Mathematics at the Naval Academy.

The Professorship of Astronomy in the University became vacant in 1855 on the death of Professor Olufsen, but not being a graduate of the University Schjellerup was debarred from obtaining it, and as the erection of a new Observatory was in contemplation it was considered desirable to appoint a man with an already acquired name, for which reasons d'Arrest (then assistant at the Leipzig Observatory) was selected. Schjellerup retained the above-mentioned appointments till the time of his death; and though he was in 1875, after the death of d'Arrest,

strongly urged by the Minister of Public Instruction to allow himself to be appointed Professor of Astronomy, he preferred remaining as he was, partly owing to the pecuniary loss the change would have entailed, partly because his position at the Observatory demanded but little routine work, while his other duties left him sufficient leisure to pursue his studies in whatever direction he chose.

As long as Schjellerup had only at his disposal the instruments of the old Observatory, he chiefly occupied himself with the computation of orbits of planets and comets, among which his determination of the orbit of the comet of 1580 deserves to be specially mentioned. This was founded on a complete reduction of Tycho Brahe's original observations of the distance of the comet from stars and of his time determinations by altitudes and azimuths of standard stars.

In 1861 the new Observatory was finished, and furnished with an 11-inch refractor by Merz and a transit circle by Pistor and Martins. With the latter Schjellerup commenced in September 1861 to observe zones of stars, chiefly of the eighth and ninth magnitude, between $+15^{\circ}$ and -15° declination, and already in the beginning of December 1863 he had finished a series of ten thousand observations, while the reductions had been pushed on with so much energy that the complete catalogue of mean places for 1865 was laid before the Royal Danish Academy of Sciences a month after. When it is remembered that the author of this work had no assistance whatever in making the observations, and in their reduction, and that he during the greater part of the year had to spend three or four hours a day in teaching, it will be conceded that he made good use of his time. The Star Catalogue is so well known for its fulness and accuracy that it is unnecessary to dwell further on it in this place. After its completion Schjellerup intended, and had already commenced, to continue the observations north of the limit of $+15^{\circ}$, as Bessel had done forty years before, but about this time his interests took a new direction, which made him discontinue systematic observations, while he was probably also influenced by the circumstance that the great undertaking of the *Astronomische Gesellschaft*, viz. the observing of all stars in the Northern Hemisphere down to the ninth magnitude, was just then planned, whereby zone work on Lalande's plan became of less importance north of the equator.

In 1866 Schjellerup published in the *Astronomische Nachrichten* his well-known catalogue of red stars, compiled from all existing star catalogues and observatory annals. It appeared most opportunely at a time when researches on the constitution of the stars were being made by means of the spectroscope, and it gave a great impulse to the study of the red stars. (A second edition appeared in 1874 in the *Vierteljahrsschrift*.) Compilations of this kind Schjellerup frequently made for his own use, but no others have been published except an index to

the observations of fixed stars in vols. 1-66 of the *Astr. Nachr.* (*Publication d. Astr. Gesell.*, viii.).

About the time of the completion of the star catalogue, Schjellerup, with his usual energy, threw himself into the study of oriental languages, especially Arabic and Chinese. In the Royal Library of Copenhagen he found a manuscript of the description of the heavens by the Persian astronomer Abd-al-Rahman al-Sūfi, a work which up to that time had been very little known among astronomers. Finding that it contained a complete and carefully made uranometry of the tenth century, or, in other words, of an epoch nearly equidistant between Ptolemy and Argelander, and at which no other estimations of stellar magnitudes are known, he resolved to translate it, and was fortunate enough to obtain the use of another MS. from the Imperial Library of St. Petersburg. After a long delay the work was published in 1874 by the Academy of St. Petersburg under the title "Description des Etoiles Fixes, composée au milieu du dixième siècle de notre ère par l'Astronome Persan Abd-al-Rahman al-Sūfi." It has been found most valuable by the astronomers, who of late years have studied the relative brilliancy of the fixed stars, and Al-Sūfi's results (which in the introduction to the work are put together in a synoptic table next Ptolemy's and Argelander's), have been systematically collated with their own by Messrs. Peirce, Pritchard, and Pickering.

The great value which this old work was found to possess for modern research induced Schjellerup to endeavour to make other observations of the ancient astronomers fruitful for the investigations of the present day. He had at first intended in a separate work to discuss these observations, chiefly with a view to their being used for the improvement of the lunar theory; but the difficulty he had found in getting the translation of Al-Sūfi published made him give up this idea, and in 1881 he began to publish a series of papers entitled "Recherches sur l'Astronomie des Anciens," of which, however, only three have yet been issued in the journal *Copernicus*. The first deals with the method adopted at Alexandria for determining the time during the night, and it shows that the time stars of Hipparchus had been so well selected that their culminations gave the correct time every hour within a minute. The second paper discusses the Chinese observations of the total eclipses of the years -728, -600, and -548, and shows that the theoretical value of the secular acceleration cannot make the zone of totality for these eclipses pass through the principality of Lu (where the observations must be supposed to have been made), thus seeming to point to the necessity of assuming a retardation of the sidereal day = $9^{\text{s}}.55 t^2$, where t is the number of centuries from 1800. The third paper compares seven conjunctions of the Moon with fixed stars, recorded by Ptolemy, with Hansen's lunar tables. The series was further to include papers on the occultations of planets observed by the

Greek astronomers on the conjunction of *Mars* and *Jupiter* 498, May 1 (observed by Thius), and the principal eclipses of the Middle Ages, but his investigations on these subjects are still unpublished. We have, however, reason to believe that as much as is ready for publication will yet be printed as soon as circumstances permit. It may here be remarked that Schjellerup often went through long calculations merely to answer some question which had occurred to him during his reading, while he rarely published anything of this kind, feeling no anxiety to bring his name before the public unless he had something of special and permanent interest to communicate.

In addition to being a man of very extensive knowledge, both scientific and general, Schjellerup was a kind teacher and friend, always willing to assist with his vast store of knowledge anybody who consulted him. He died at the Copenhagen Observatory on November 13, 1887, after a prolonged illness, leaving a memory which will be gratefully cherished by those who had the good fortune to know him.

He was elected an Associate of this Society January 10, 1879.

J. L. E. D.